Minnesota-FirstNet Consultation Project Kickoff (MnFCP)

Regional Kickoff Meetings January 22 – February 7 2014

Speaker:

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Mark Navolio & Rick Burke, Televate LLC Project & Program Manager

Emergency Communication Networks is a division of the Minnesota Department of Public Safety

- The statewide 9-1-1 program
- Allied Radio Matrix for Emergency Response (ARMER)
- Communications Interoperability
- Statewide Emergency Communications Board standards and projects
- Minnesota/FirstNet Consultation

Agenda

- Introductions: Project Briefing

- What is FirstNet?

- Brief Introduction to LTE

- Project Mission & Goals

- Project Organization

- Project Scope of Work / Tasks

- Support Required

- Next Steps

About Televate

Company Overview

Founded in 2001, Televate is a leading engineering consultancy delivering innovative communications and IT services and solutions for public safety and critical infrastructure industries. Our technology and program management experts design sustainable, interoperable land mobile radio, wireless broadband networks and applications, and advanced information technology solutions.

Our Expertise

• Broadband Networks (700 MHz, 4.9 GHz, LTE, Wi-Max, Wi-Fi, Microwave, Fiber)
• Land Mobile Radio (P25 Voice & Data, Narrowbanding, RF Testing)
• Network Planning and Project Management
• Business Modeling and Development
• Interoperable Communications
• Strategy and Planning

Who is FirstNet?

Why FirstNet?

- LMR does a great job of providing mission critical voice, however…
- Public safety agencies have been relying more and more on wireless data services (Verizon, AT&T, etc.), but there have been problems:
  - **Lack of Availability:** commercial network tend to become busiest during emergency events
  - **Lack of Reliability:** most commercial networks are not built with the level of redundancy as public safety
  - **Lack of Coverage:** commercial networks prioritize populated areas first; whereas public safety strives for ubiquitous coverage
- Benefits
  - Better Price & Choice: adopting a commercial standard (LTE) provides a much greater marketplace (2 billion vs. 25 million public safety worldwide)
  - Keeps Pace with Technology; with a great emphasis on backward compatibility
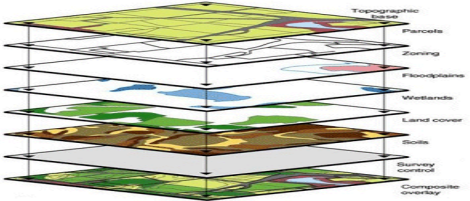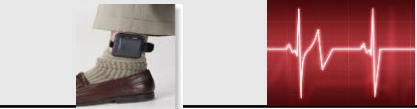
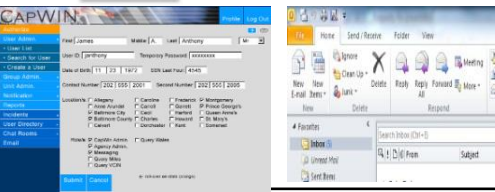# Why LTE? Throughput

12.5 KHz P25 pipe
- A single mission critical voice stream

10 MHz broadband pipe

- Video
- Internet
- Database downloads
- Multiple mission critical voice streams
- Push-to-Talk (non mission critical voice)
- Text messaging
- RoIP
- Messaging/Text
- Metadata

800 x more bandwidth

Ability to Support High Bandwidth Applications

Applications made possible by 4G Wireless Broadband		Capacity
Text Based Database Lookups	NCIC look-ups, RMS entries, text messages	Low
Geographical Information Systems	Automatic vehicle location, CAD location display	Low to Medium
	Preplans, Building Utilities Layers	High
Video	Traffic, Helicopter, School, Dashboard, Security, Helmet/Lapel cams, etc. (varies in resolution)	High to Very High*
Telemetry, AVL	Patient and responder biometrics, offender bracelets	Low
Common Apps & Desktop Extension	Email: varies depending on content of messages; web browsing: plug-ins, images, animation affects throughput needs	Medium to High

Creation of FirstNet

- Middle Class Tax Relief and Job Creation Act of 2012, passed Congress on February 17, 2012, establishes:
  - "FirstNet" First Responder Network Authority, build & operate
  - "NPSBN" Nationwide Public Safety Broadband Network
  - Requires FCC to allocate the D Block spectrum to public safety; D Block, 10 MHz; for a total of 20 MHz
- The FCC tasked with Technical Advisory Board for define requirement for interoperability
  - Develop minimum technical requirements
  - Ensure nationwide standards for use and access to the network
- FirstNet is the sole authority to build, operate & maintain the NPSBN
  - Issue open, transparent, and competitive request for proposals (RFP) to private sector entities

FirstNet Funding

- $7 billion in funding to build out the NPSBN;
  - $2B available now
  - $5B after successful auctions
- FirstNet is authorized to charge user fees as necessary to maintain and sustain the network.
- $135M to NTIA to establish a State and Local Implementation Grant Program (SLIGP)
  - Grant program to assist States, and their regional, tribal, and local jurisdictions, to identify, plan, and implement state's portion of nationwide NPSBN
  - 20% state match required
- $300M for research and development grants (NIST – National Institute of Standards & Technology)
- $115M for 9-1-1 and NG 9-1-1 grants.

FirstNet Timeline

| Date	Milestone
February-12	• Legislation authorizing and funding of FirstNet is signed
August-12	• FirstNet Governance Board members appointed • State and Local Implementation Grant Program (SLIGP) requirements announced
February-13	• FirstNet releases State and Local Implementation Grant Program (SLIGP) Federal Funding Opportunity (FFO)
May-13	• FirstNet Regional Workshops were held initiating their outreach with the States
To be determined	• FirstNet visit to the state to determine users & coverage needs.
Q3/Q4-2014 (estimated)	• FirstNet issues RFP for NPSBN construction & operation
Q1-2015 (estimated)	• FirstNet informs the State of their deployment/funding Plan
Within 90 Days after notice of plan	• States inform FirstNet whether they will participate in NPSBN deployment or build their own Radio Access Network (RAN); • Opt-In / Opt-Out
180 Days after Opting-Out	• Opt-Out Scenario: States must develop & complete RFPs for constructing, maintaining, and operating the state RAN • Approval by the FCC

LTE Basics

- 3GPP = Third Generation Partnership Project
  - Standards Group
  - Global: Consists of manufacturers and operators (over 400 Members) from all regions of the world
  - Developer of GSM (2G), UMTS (3G), and LTE (4G) standards
- Long Term Evolution (LTE)
  - First commercial standard released 2008 (Release 8)
  - First commercial launch in 2009 (Sweden)
  - Release 10 in Q3-2012

- LTE By The Numbers:
  - 32 US carriers in service
  - 224 global carriers in 84 countries
  - 1 billion LTE Users expected within 5yrs
  - 66% subscriber growth rate from December 2012 to June 2013
- Public Safety Adoption
  - Movement worldwide to move toward LTE

LTE Basic

- LTE (typ.) uses the entire spectrum block in three sectors at each site
- Cells constantly adjusting power based on need to manage interference
- Amount of capacity available to a single user depends on a variety of factors
  - Available spectrum resources
  - Signal level
  - Interference levels
- LTE has robust Quality of Service (QoS) capabilities to manage resources
  - Pre-emption
  - Priority
  - Applied by user (device) or application

| Category	LTE Performance
Peak Downlink Data Rate	Theoretical peak 86 Mbps
Peak Uplink Data Rate	Theoretical peak 36 Mbps
Est. Cell-Edge DL Throughput	0.5 Mbps per user
Est. Cell-Edge UL Throughput	0.3 Mbps

Source: NPSTC BBTF (10 MHz Channel)
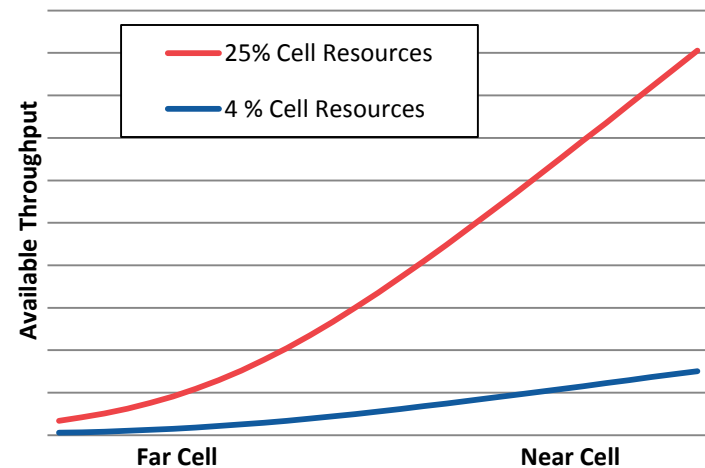
700MHz Device Support

- 700 MHz Band derived from TV channels 50 – 69
- Carriers, (Verizon, AT&T & others) are in this band, however, devices capable of roaming to public safety spectrum are not widespread yet
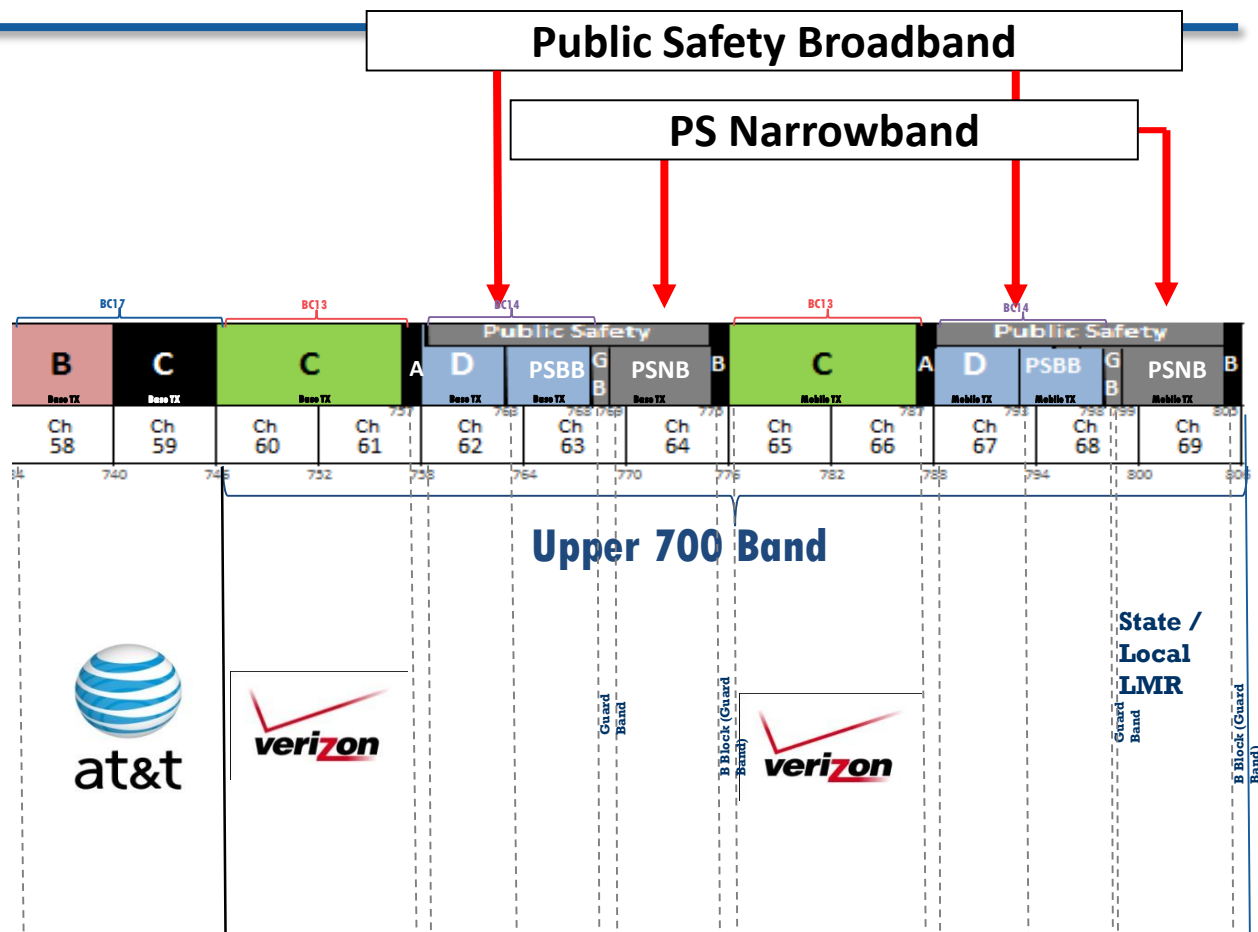
- LMR link budget is better than LTE at <u>broadband speeds</u>
  - LTE range is less than LMR (250mW versus 5W)
  - 4G requires far more sites to match coverage
  - E.G. Washington, DC – 12 broadband sites to cover 90% <u>outdoors</u> versus 10 LMR sites to cover 95% <u>indoors</u>
- However, LTE could scale to non-broadband speeds
- And, experiments are underway to find ways of extending LTE coverage for rural areas (PSCR)
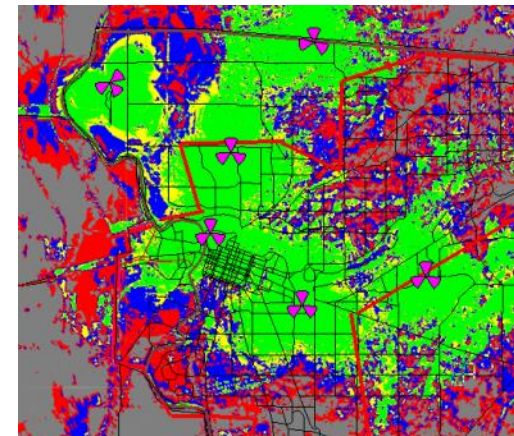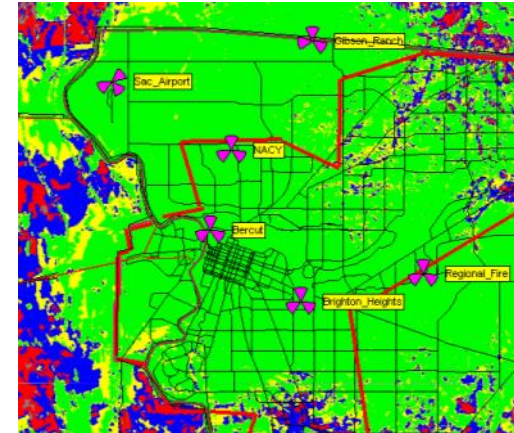
Coverage

Region	ARMER Sites	New Sites	Total	% New
Central	63	20	83	24%
Metro	70	36	106	34%
Northeast	97	35	132	27%
Northwest	59	18	77	23%
South Central	20	3	23	13%
Southeast	39	18	57	32%
Southwest	32	11	43	26%
Total	**380**	**141**	**521***	**27%**

* Building for indoor handheld coverage and greater capacity in the urban areas would require significantly more new sites
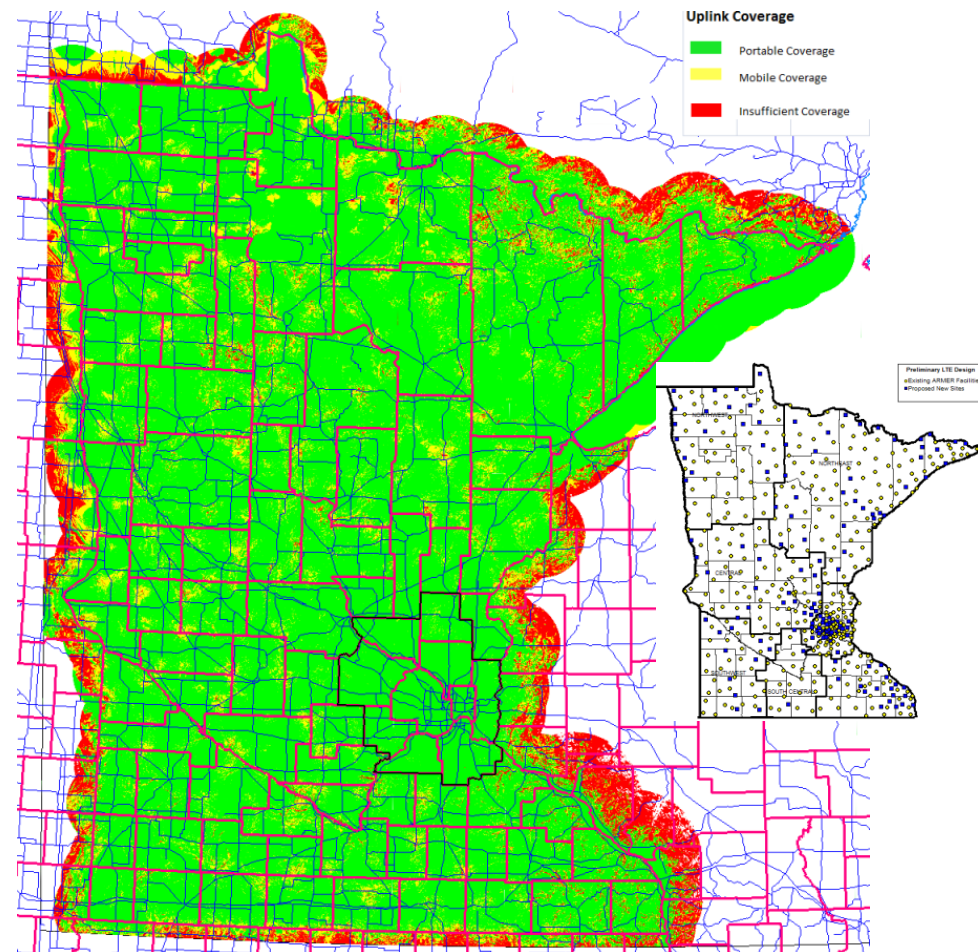
LTE Components

- End to End IP
- EPC (Evolved Pack Core)
  - System Management and Monitoring Subsystem
- Radio Access Network
  - eNodeBs (base stations)
  - Backhaul Subsystem
- User Equipment (UE or devices)
- What will FirstNet deploy in the state? May look to leverage:
  - Existing backhaul connectivity
  - Existing towers, buildings, etc.?

UE

Antenna Support Structure

Redundant EPC*

Primary EPC

Backhaul

UE

eNodeB

Agency Networks leveraging Backhaul

Agency Networks, and the Internet

What is SLIGP?

Org. Chart

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                        ┌─────────────────┐
                        │      SIEC       │
                        └─────────────────┘
                                 │
                    ┌────────────────────────┐
                    │   MnFCP Project Team    │
                    │   Dept. Public Safety   │
                    │     Jackie Mines        │
                    │     Brandon Abley       │
                    └────────────────────────┘
                                 │
  ┌────────────────────┐   ┌────────────────────┐
  │ Joe Ross / Rick    │───│   Mark Navolio     │
  │ Burke              │   │   Project Manager  │
  │ Program Manager    │   │                    │
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        ┌────────────────────────┼────────────────────────┐
  ┌──────────────┐      ┌──────────────────┐      ┌──────────────┐
  │ Ken Boley    │      │ Justin Compito   │      │ Doug         │
  │ Governance / │      │ SME /            │      │ Greenwood    │
  │ MOA          │      │ Project          │      │ SME          │
  │              │      │ Coordinator      │      │              │
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  │ Christopher  │      │ TBD              │      │ Afeite Djada │
  │ Webster      │      │ Project          │      │ SME          │
  │ Legal Support│      │ Coordinator      │      │              │
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- Task 1 – Project Plan
- Task 2 – Governance Recommendation
- Task 3 – Tribal Representation
- Task 4 – Education and Outreach
- Task 5 – Stakeholder Entity List
- Task 6 – MOU and MOA
- Task 7 – State and Stakeholder Volunteers
- Task 8 – Requirements Gathering
- Task 11 – Financial Sustainability Plan
- Task 9 – SCIP Recommendations
- Task 10 – Data Discovery and Collection

Project Plan

FirstNet Consultation Project
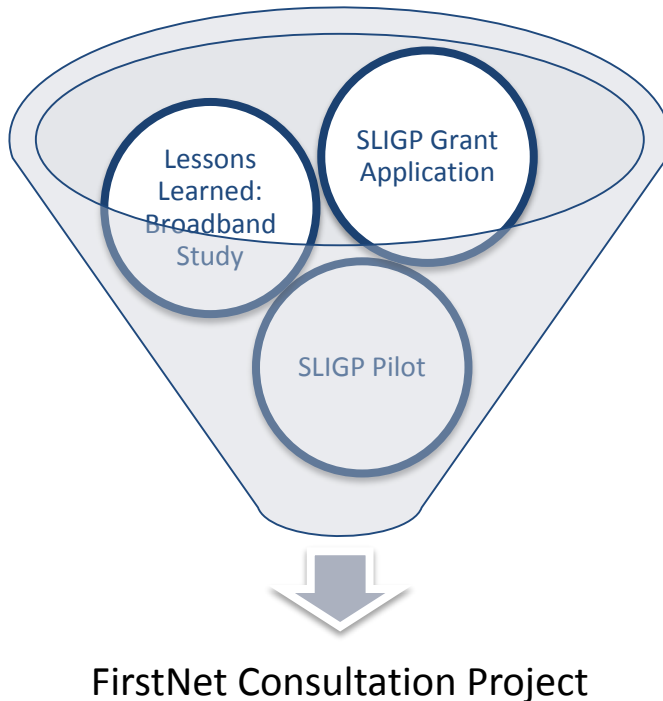
- FirstNet
  - State Consultation
  - RFP Proposal
- BTOP Grantees
  - Monitor progress and approach
- Vendors
  - LTE announcements
- NPSTC & PSCR
  - Standards & Requirements

Project Objectives

- Prepare the State of Minnesota and its public safety communications governance for FirstNet consultation.
    - Governance Recommendations
    - MOA / MOU Sharing Agreements
    - SCIP Recommendations
- Equip the State with the necessary information to engage with FirstNet; that accurately supports the needs of its stakeholders and sustainability.
    - Stakeholder Working Groups
    - County-by-County Assessments
    - Partner Evaluation / Sustainability Plan
- Perform the Minnesota-FirstNet consultation process required under The Act.
    - Collect and Aggregate Stakeholder Entities Statewide
    - Tribal Outreach
    - Education and Outreach
- Facilitate the deployment of the NPSBN
    - Data Discovery and Collection

Governance

Research
- Interview knowledgeable individuals to identify and evaluate existing governance bodies
- Research structure, membership, charters, bylaws, rules, statutes
- Include government at all levels, tribes, private entities, neighboring states, Canada.

Analyze
- Evaluate capabilities of current governance bodies
- Strong flow of information between FirstNet and Minnesota PoC
- Assess ability to develop and perhaps implement priority access management
- Determine ability to address use and sustainment of network

Recommend
- Report on findings
- Build on strengths, shore up weaknesses
- Propose measures to improve information flow and adapt to evolving NPSBN role

MOA MOU & SLA

Research

- Identify existing telecom infrastructure sharing agreements to determine terms acceptable to state/local agency asset owners
- Identify existing SLAs used by Minnesota agencies and commercial entities for purchase of telecom services
- Review Minnesota law for potential legal issues implicated in use of envisioned templates

Produce

- Two standard MOA templates for government and private asset owners with FirstNet regarding (1) radio infrastructure, and (2) data/backhaul infrastructure
- Two standard SLA templates: (1) FirstNet provision of NPSBN service to users, and (2) government and commercial entity provision of services to FirstNet
- A standard MOU template for use by State government and FirstNet in providing non-public safety partner access to the NPSBN.
- A Report providing a general rationale for these agreements and describing any legal issues they raise

Governance/MOA Support

Governance	MOA
• People who know about existing governance organizations • Documents relevant to existing governance organizations	• People who know about existing agreements, help obtaining those agreements • Consultation with Attorney General's Office re: potential legal obstacles to desired agreements

Education & Outreach

- Goals:
  - Inform and update stakeholder on the MnFCP
  - Education/Apprise on LTE, FirstNet, and the implementation
- Minnesota Indian Affairs Council Recommendations
- Presentations and Workshops
  - Interoperability Conference April 14th – 16th
  - Conference: Association of Minnesota Counties
  - Quarterly SRB Meetings
- MnFCP Website & Educational Materials
  - Partnership w/Alexandria Technical and Community College
  - MnFCP Newsletter and Brochure (quarterly)
- Webinars & Online self-passed training modules
  - **What is Wireless Broadband for Public Safety?**
  - LTE for the public safety practitioner
  - LTE for the IT manager
  - LTE for the radio manager
  - Broadband wireless applications & devices
  - LTE Systems 101

Level of Effort

- Most labor intensive part of the project

Task	PHASE ONE	Televate Team Hrs	SWIC Hrs	RIC Hrs	Stake-holder Hrs
Task 1	Task 1 - Program Management (Phase 1)	84	13	12	
Task 2	Task 2 - Governance Recommendations	130	33	36	48
Task 3	Task 3 - Tribal Representation	71	14	21	88
Task 4	Task 4 - Education and Outreach (Phase 1)	755	329	442	2,800
Task 5	Task 5 - Stakeholder Entity List & Survey	915	178	322	2,065
Task 6	Task 6 - MOU & MOA (Phase 1)	95	76	105	288
Task 7	Task 7 - State & Stakeholder Volunteers	684	82	54	208
Task 8	Task 8 - Requirements Gathering	1,834	344	591	5,194
Task 9	Task 9 - State & Stakeholder Volunteers	77	21	94	
	PHASE TWO				
Task 1	Task 1 - Project Plan (Phase 2)	658	164	492	48
Task 4	Task 4 - Education and Outreach (Phase 2)	342	344	310	1,776
Task 6	Task 6 - MOU & MOA (Phase 2)	125	72	148	384
Task 10	Task 10 - Data Discovery & Collection	2,637	203	369	782
Task 11	Task 11 - Business Plan	850	136	108	

Identify Stakeholders
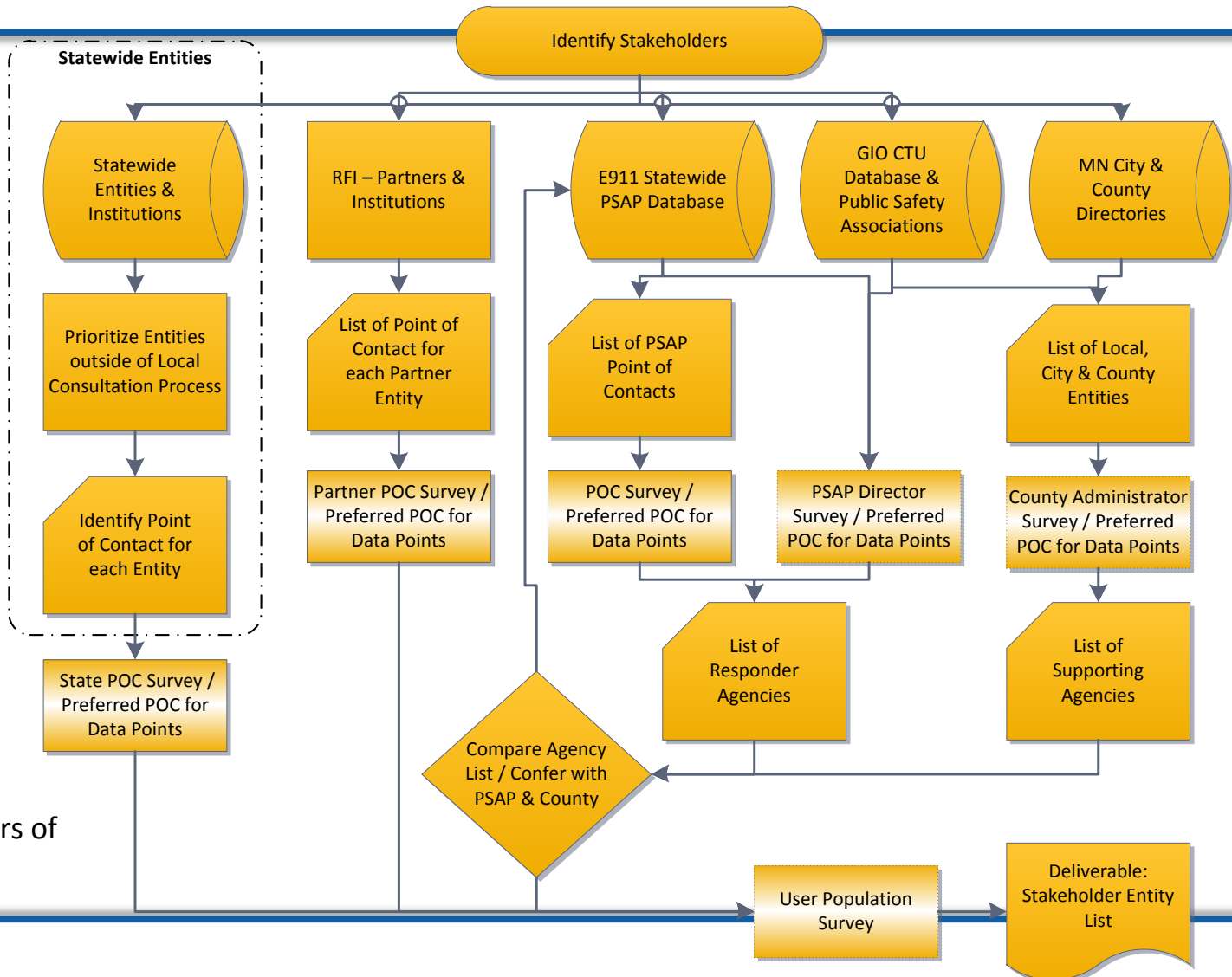
Outreach Surveys

Survey Type	Objectives
POC Surveys:	■ Identify a POC for assessing the number of potential NPSBN subscribers ■ Identify a POC for assessing the user requirements ■ Identify a POC for identifying available infrastructure ■ Identify a POC for assessing the terrestrial coverage (public safety agencies only)

Survey Type	Objectives
User Population Survey[3]:	■ Assess the potential number of NPSBN subscribers ■ Assess the preferred device types ■ Assess the current spending ■ Assess the barriers to adoption

- Surveys are kept short (*cheat-sheet*)
- Surveys tailored to each stakeholder community

Potential User Population – State Agencies

Category	Minnesota State Employees	Total Full-time Employees
First Responders	Police Officers Only	549
First Responders	Firefighters Only	-
First Responders	Other Police Employees	426
First Responders	Other Fire Employees	-
Total	975	
Other Emergency Service Functions	Hospitals	3,552
Other Emergency Service Functions	Health	2,349
Other Emergency Service Functions	Water Supply	-
Other Emergency Service Functions	Water Transport and Terminals	-
Other Emergency Service Functions	Gas Supply	-
Other Emergency Service Functions	Corrections	4,103
Transportation	Transit, Highways, Air Transportation	6,936
Utilities	Electric Power	-
Other Govt. Employees	All Education Related	31,913
Other Govt. Employees	All Other Govt. Employees	16,837
Minnesota State Total	66,665	

Potential User Population – Local Jurisdiction

Category	Minnesota Local Employees	Total Full-time Employees
First Responders	Police Officers Only	6,737
First Responders	Firefighters Only	1,841
First Responders	Other Police Employees	2,030
First Responders	Other Fire Employees	157
Total		**10,765**
Other Emergency Service Functions	Hospitals	3,913
Other Emergency Service Functions	Health	1,938
Other Emergency Service Functions	Water Supply	1,326
Other Emergency Service Functions	Water Transport and Terminals	33
Other Emergency Service Functions	Gas Supply	110
Other Emergency Service Functions	Corrections	3,936
Transportation	Transit, Highways, Air Transportation	5,609
Utilities	Electric Power	856
Other Govt. Employees	All Education Related	44,136
Other Govt. Employees	All Other Govt. Employees	26,326
Minnesota Local Total		**98,948**
Grand Total		**165,613**

Requirements Gathering

- Objective: Document the requirements of state and local first responders

- Working Group Volunteers; to establish statewide standards
  - Service Area
  - Devices, Form Factors, and Functionality
  - System Requirements
  - Security Requirements
  - Next Gen911 and Applications

- County-by-County Assessment
  - Identify Coverage Priorities; using historical CAD incident data & existing commercial coverage (identify variances of commercial service)
  - Usage Cases envisioned for each service area
  - Identification of assets that may be made available to FirstNet

Work Group Volunteers

Topic Area	Skill Required
Service Areas (coverage types) • Indoor, in-vehicle, pedestrian, etc.	First / Secondary responders & radio network engineers
Devices (modem, tablet, smartphone, etc.) • Form Factors (hardening, screen, buttons) • Functionality (Bluetooth, WiFi, aGPS)	First or Secondary responders
Security and Network Requirements • Data requirements of sensitive data	IT managers, radio managers, technical first/secondary responders
System Requirements • E.G. Incident Commander Requirements	Incident commanders, subject matter experts (security, radio network & IT engineers)
Applications & Next Gen911 • Incident based applications	First / Secondary responders, PSAP directors, & dispatchers

- Three to five meetings / conference calls
- Review existing documentation, propose requirements, or revisions to existing requirements
- Estimate 16 - 36 hours over 3 months

WG Apps & Devices

1. Assess Incident Activity
   - Prioritize by Agency
2. Assess Application(s) per Incident Activity
   - Per Agency
   - Present / Future
3. Review Incident / Application Summary
4. Assign Device Type(s) to Incident Activity
5. Review Form Factor & Functionality – advantages / disadvantages, costs & trade offs
6. Prioritize Form Factors & Functionality
7. Review Device Summary

Task 6 – Working Group Process

Incident Types

Assessment:
- Priority/Importance
- Agency involvement

Application / Incident / Agency

Assessment:
- Mission Critical
- Present/Future
- Hosted/State/Local

Application Summary

Device Type

Assessment:
- Review of Cost Implications
- Form Factor
- Functionality

Device Summary
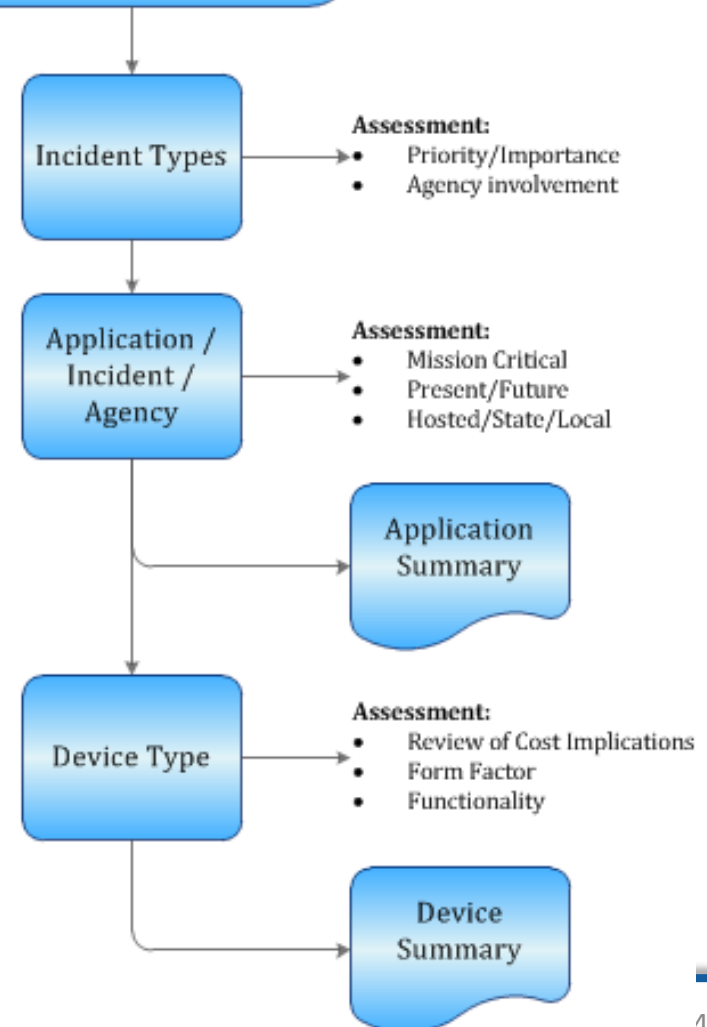
Performance Requirements Estimation

In the end the network needs to support your data needs
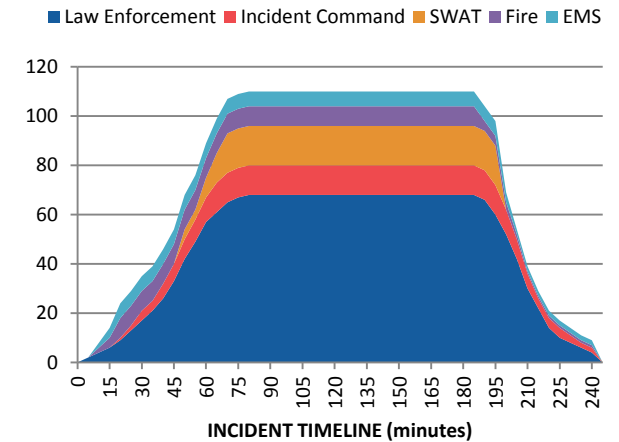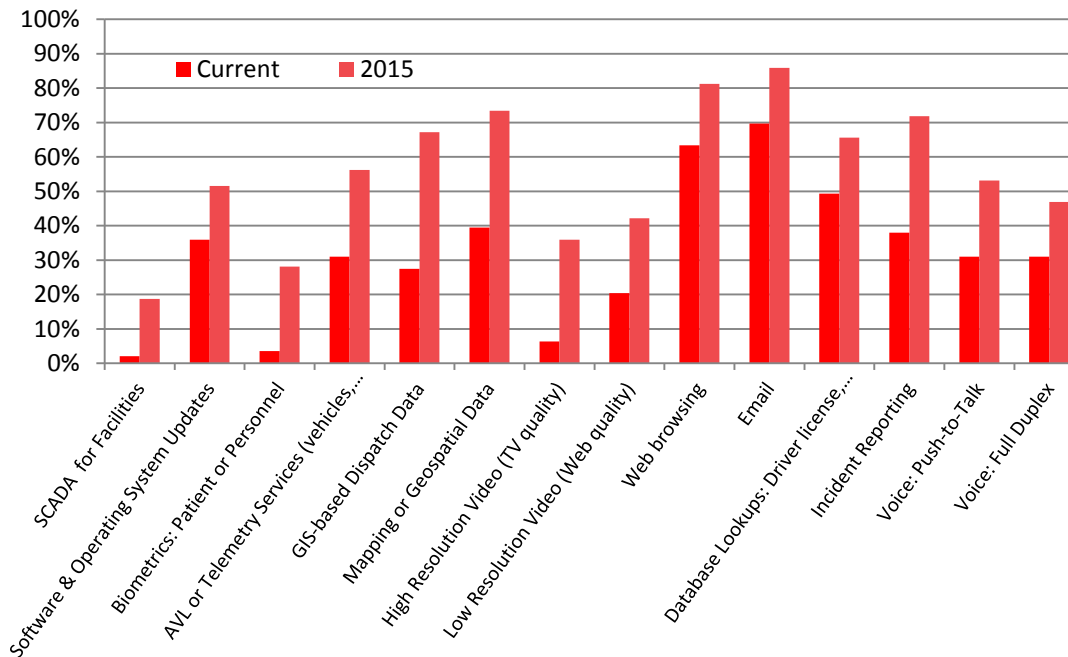
Totals	PEAK Uplink	PEAK Downlink	Average Uplink	Average Downlink
Tactical Teams Subtotal:	0 kbps	0 kbps	0 kbps	0 kbps
Incident Command Subtotal:	904 kbps	6849 kbps	241 kbps	3381 kbps
Staging Area Subtotal:	220 kbps	308 kbps	124 kbps	212 kbps
Perimeter Subtotal:	257 kbps	256 kbps	257 kbps	256 kbps
INCIDENT TOTALS:	1382 kbps	7414 kbps	623 kbps	3849 kbps

- CAD incident data to be differentiated by incident type
- Coverage Areas to be defined/ harmonized statewide by subcommittee
- Suitability of commercial coverage
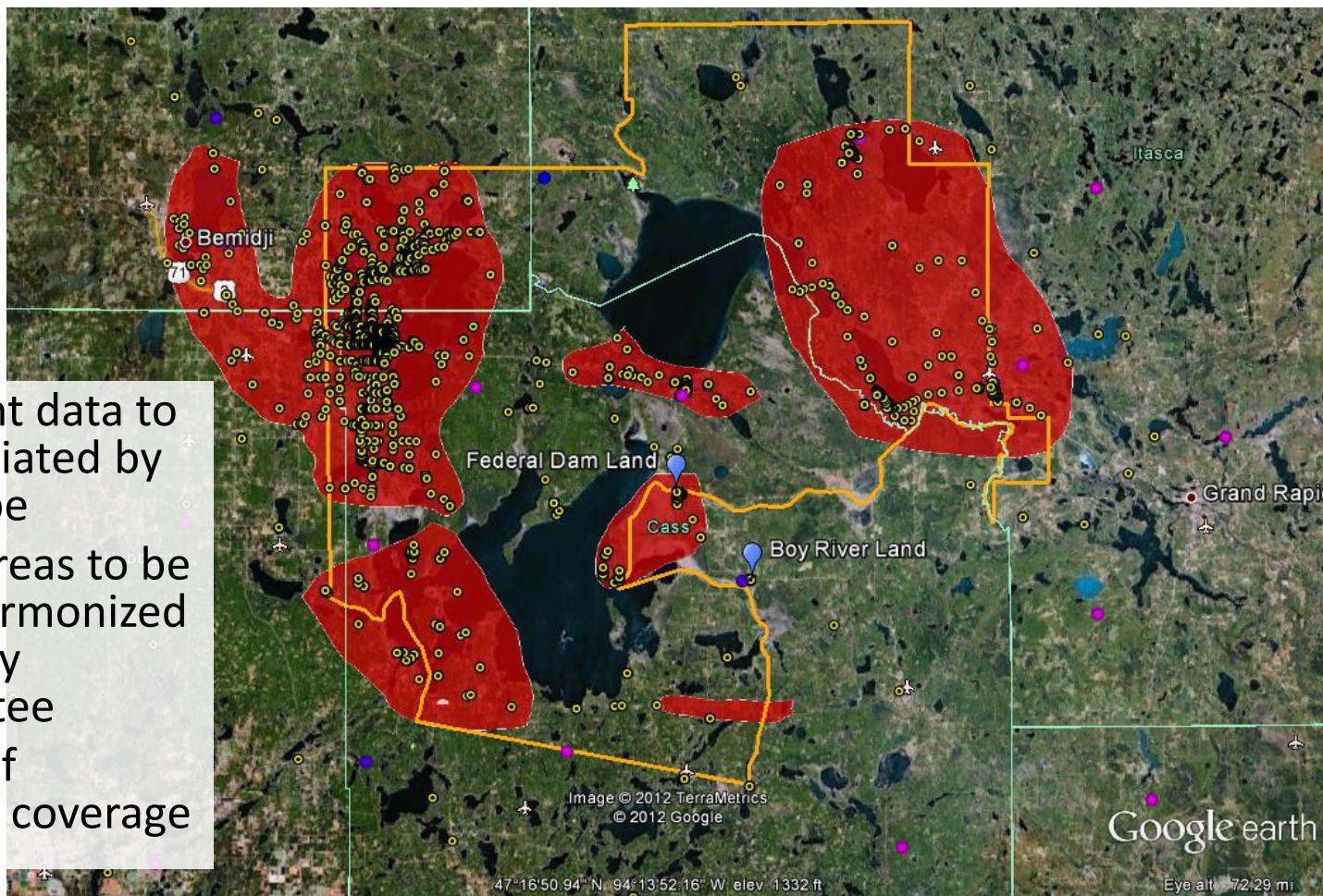
Task 9 – SCIP Recommendations

- Review 2012 SCIP Initiatives

- Distill and incorporate FirstNet recommendations

- Integrate the State's requirements

- Draft & Propose Recommendations

- Shall incorporate FirstNet requirements (Phase 2)
- To be build on the information collected during the county-by-county assessments
- Leverage existing STATE databases to minimize data collection
- Phase 2, On-site Site Visits

Financial Sustainability Plan

- Goal:
  - full financial sustainability plan applicable to each stakeholder agency
- Potential Partners could bring:
  - Assets,
  - Users,
  - Funding
- Financial modeling includes:
  - Lessons learned from Phase 1 approach & Televate's national model
  - Inputs from BTOP grantees
  - Up-to-date FirstNet announcements

Utilities

Wireline Telcos

Existing Cellular Carriers

New Entrants

Potential Partners
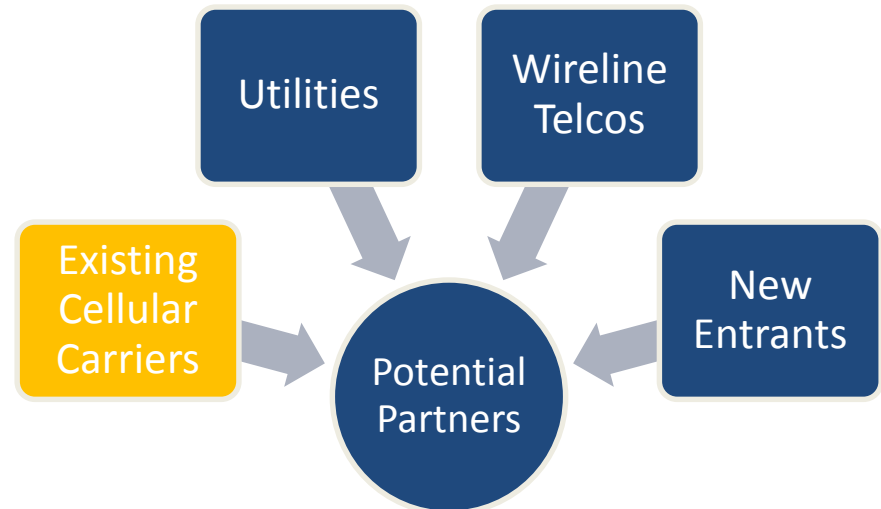
PSBN Expenditures
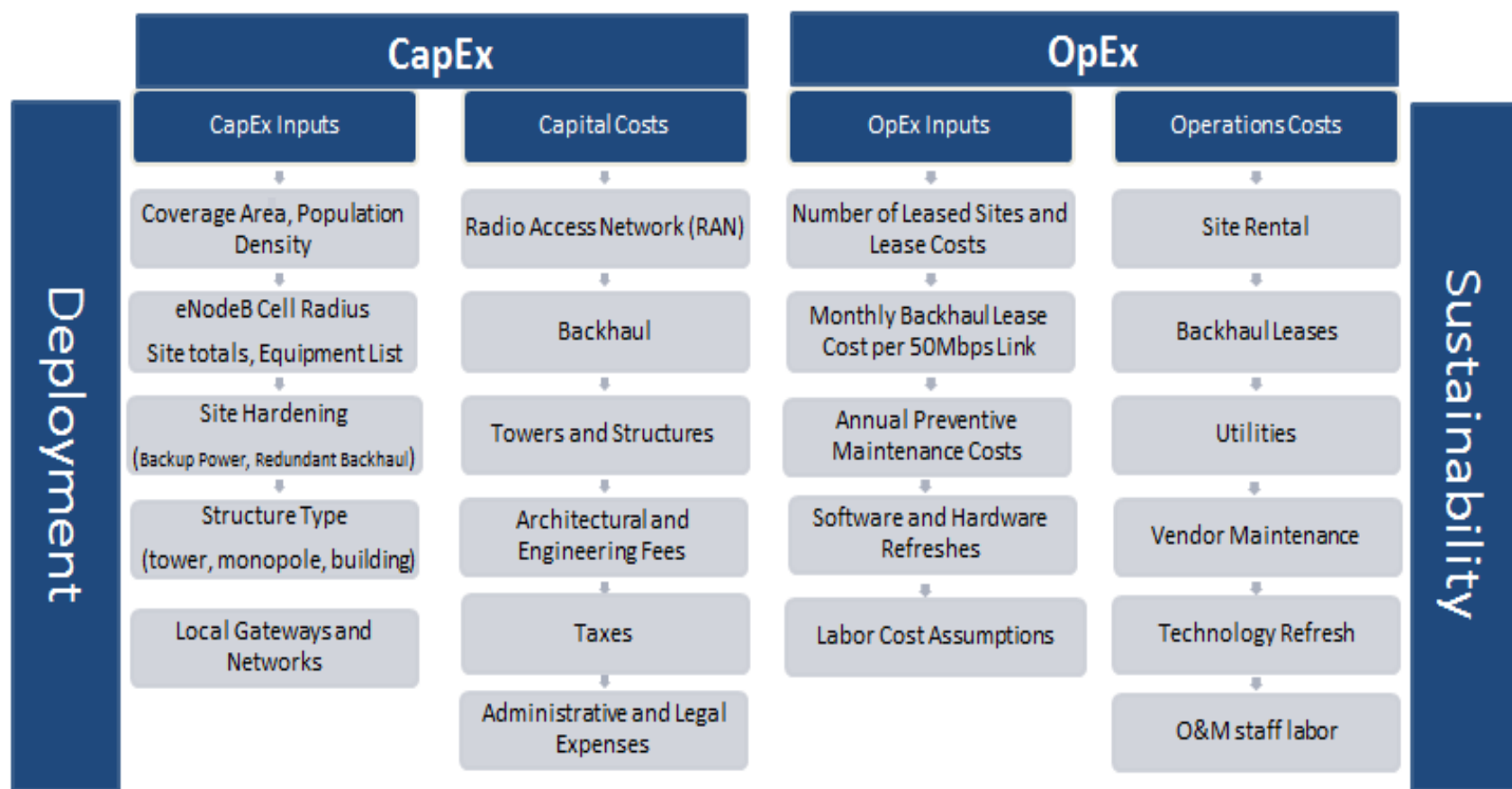
- ## Task 4 – Regional & Tribal Kickoff Meetings
  - Each of the 7 Regions **January 21st – February 7th**
    - St Cloud, St Paul, Duluth, Thief River Falls, Marshall, Mankato, Rochester
    - Afternoon and Evening Kickoff Meetings; added to cater to the volunteer agencies

- ## Task 5 – Stakeholder Entities **December – March**
  - Identification of stakeholder entities
  - Collection of CAD data **February**

- ## Task 8 – Subcommittees **February – April**

- ## Tasks 2 & 6 – Governance & MOA **December – April**
  - Gather contacts & documentation

Questions?

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